REMARKS

Claims 1-5, 8-11, 14-17, 20-23, 26-29, 32-35, and 37-39 were presented for examination, claims 6, 7, 12, 13, 18, 19, 24, 25, 30, 31, and 36 having been withdrawn from consideration. Claims 1, 8, 14, 20, 26, and 32 are independent. Applicants respectfully submit that the pending claims are in condition for allowance.

Applicants thank the Examiner for withdrawing the 35 U.S.C. §102 rejections of claims 1-5, 8-11, 14-17, 20-23, 26-29, 32-35, and 37-39 (Office Action at pages 2-3).

Claim Rejections under 35 U.S.C. §103(a)

In the Office Action:

claims 1-5, 8-11, 14-17, 20-23, 26-29, and 32-35 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro et al., Omics: A Journal of Integrative Biology, Vol. 7, No. 4, 2003 (hereafter "Sauro") in view of Kurata et al., Nucleic Acids Research, Vol. 31, No. 14, p.4071-4084, 2003 (hereafter "Kurata") (See the Office Action, page 4); and

claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata, and further in view of Shannon et al., Genome research, Vol. 13, p. 2498-2504, 2003 (hereafter "Shannon") and in view of *Presentation of Biospice*, DARPA BioComp, May 2002 (hereafter "Biospice") (See the Office Action, page 5).

Applicants respectfully traverse the rejections.

Claims 1-5

Applicants' claim 1 recites:

> 1.   A system for improved modeling of a biological system that comprises a plurality of chemical reactions, the system comprising:
> a modeling component comprising a graphical user interface for accepting user commands and input to construct a model of the biological system, the model being represented in a tabular view and a graphical view, ***the tabular view being a***

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representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables;

a simulation engine accepting as input the constructed model of the biological system and generating as output dynamic behavior of the biological system; and

an analysis environment in communication with the simulation engine, the analysis environment displaying dynamic behavior of the biological system.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*, which is present in Applicants' claim 1.

Neither Sauro nor Kurata disclose or suggest that *the tabular view is adapted to receive the user commands and input to construct the model*. The Examiner alleges that Sauro discloses this feature of claim 1 in the lower left portion of Figure 12 (Office Action at page 5). Applicants respectfully disagree.

Sauro states that "the lower panel [of Figure 12] shows the SBWMetatool interface; this displays all the elementary modes that METATOOL found for the displayed model" (Sauro at page 366, first paragraph, lines 3-4, *emphasis added*). Applicants respectfully urge that Figure 12 does not depict a tabular view of a model that is *adapted to receive user commands and input* that is used *to construct the model*. The model shown in Figure 12 has already been constructed and is being displayed.

Further, the cited Figure 12 of Sauro is not *a tabular view being a representation of at least a portion of the model in one or more tables*. Sauro states that one of the elementary modes is highlighted in the lower panel in Figure 12, and the corresponding reactions are highlighted on the model displayed on the main canvas in Figure 12. (See Sauro, page 366).

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Sauro, however, does not disclose or suggest that the lower left portion of Figure 12 is a representation of at least a portion of the model in one or more tables.

The Examiner also alleges that, in Sauro, the models are entered in the form of a script stored in SBML, and that "the SBML script is another tabular form of a model" (Office Action at page 5, citing Sauro at pages 364 and 366). Sauro indicates that the tools described in the cited passages use models stored in SBML, but does not indicate how those models are constructed. Claim 1 includes a *tabular view adapted to receive the user commands and input to construct the model*. Nothing in Sauro indicates that a tabular view receives user commands and input to construct the model.

Kurata also does not disclose or suggest that *the tabular view is adapted to receive the user commands and input to construct the model*. In Kurata, the model is constructed by drawing a map of the molecular network, and not by entering user commands and input into a tabular view (Kurata at page 4076, first column, "Graphical User Interface" and following two paragraphs). Nothing in Kurata suggests a *tabular view adapted to receive the user commands and input to construct the model*

Further, neither Sauro nor Kurata discloses or suggests that the tabular view *displays at least one of the plurality of chemical reactions in the one or more tables*. The Examiner acknowledges that Sauro does not disclose this feature of claim 1 (Office Action at page 5, last two lines), and instead relies on Kurata for the above-quoted feature of claim 1.

However, one having ordinary skill in the art would not combine Kurata and Sauro to present a tabular view that *displays at least one of the plurality of chemical reactions in the one or more tables*. Kurata is generally directed to developing a new, unique, and "sophisticated" notation to represent signal transduction pathways (Kurata at Abstract). Kurata proposes unique representations of reaction equations, diagrams, and models. To implement Kurata's representations in Sauro would require that the underlying framework of Sauro be modified. Because one of Sauro's stated goals is that additional modules should be added without modifying the underlying framework, Sauro teaches away from modifying his underlying framework. Thus, one having ordinary skill in the art would not combine Sauro with Kurata to

present a tabular view that *displays at least one of the plurality of chemical reactions in the one or more tables*.

Specifically, Kurata indicates that conventional notations and representations of chemical reactions are not useful for his purposes, and therefore develops new representations and notations. Kurata extensively details the limitations of chemical reaction equations, calling them neither "suitable" nor "meaningful" (Kurata at page 4072, "Regulator-Reaction Equation," first paragraph).

Kurata concludes that a new type of equation, the regulator-reaction equation, is necessary. Kurata's regulator-reaction equations are displayed in the passage of Kurata that the Examiner cites in the Office Action (i.e., Kurata at Figure 3; *see* Kurata at page 4076, "Graphical User Interface," first paragraph). Kurata generates the regulator-reaction equations from "a unique diagram" created in Kurata's program (Kurata at 4073, right column, lines 16-17).

Sauro is generally directed to a system that leverages existing modules in a "resource sharing framework" (Sauro at page 355, "Materials and Methods, first line). The stated purpose of Sauro is to develop a "software framework that allows heterogeneous application components – written in diverse programming languages and running on different platforms – to communicate and use each others' capabilities" (Sauro at Abstract). This requires a framework that ensures "interoperability" between the modules (Sauro at page 355), including the use of a common format for the models.

Sauro indicates that "it must be possible to implement [the tools and methods] as modules that can be hooked into the existing framework without having to modify the framework itself" (Sauro at page 355, "Materials and Methods," *Component Modularity*). In contrast, Kurata describes a system that utilizes "unique" and "sophisticated" representations (Kurata at page 4072, right column, lines 5-6) of equations, diagrams, and models whose inclusion would require a modification of Sauro's framework. Because Kurata does not represent the chemical reactions using standard chemical reaction equations, Sauro's framework would have to be modified so to accommodate Kurata's equation format. This modification would decrease interoperability between modules, require modifications to the existing framework, and would not allow for free distribution of the software (all indicated as

"requirements" of the "highest priority" in Sauro at page 355). Therefore, one having ordinary skill in the art would not modify Sauro to utilize Kurata's formats, including the unique regulator-reaction equations in the cited passages of Kurata.

For at least the reasons set forth above, Applicants urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest Applicants' claimed *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*. Therefore, Applicants respectfully urge that the above 35 U.S.C. §103(a) rejection of claim 1 be withdrawn.

Claims 2-5 depend from independent claim 1 and, as such, incorporate all of the features of claim 1. Claims 2-5 are therefore allowable for the same reasons as claim 1. Moreover, the Examiner provides no justification for the rejection of claims 2-5. While the Examiner provides an analysis of the features of claim 1, the Examiner does not address the features of claims 2-5 at all. Applicants respectfully urge that dependent claims 2-5 recite additional patentable subject matter and respectfully request that the Examiner pass claims 2-5 to allowance.

Therefore, for at least the reasons set forth above, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 2-5 be withdrawn.

<u>Claims 8-11</u>

Applicants' claim 8 recites:

> 8.   A computer-implemented improved method for modeling a biological process comprising a plurality of chemical reactions, the method comprising:
>   providing a graphical user interface for accepting user commands and data;
>   receiving, via the provided user interface, user commands and data;
>   constructing, using the received user commands and data, a model of the biological process, the model being represented in a tabular view and a graphical, *the tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user*

> *commands and input to construct the model and display at least*
> *one of the plurality of chemical reactions in the one or more*
> *tables*;
>   generating, using the constructed model of the biological
> process, dynamic behavior of the modeled biological process; and
>   displaying the dynamic behavior of the biological process
> on a display device.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*, which is present in claim 8.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view is adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*. In Sauro and Kurata, there is no tabular format that receives user commands to construct the model.

Further, neither Sauro nor Kurata discloses or suggests that the tabular view is adapted to *display at least one of the plurality of chemical reactions in the one or more tables*. The Examiner recognizes that Sauro does not disclose this feature of claim 8 (Office Action at page 5). Instead, the Examiner relies on Kurata for the above-quoted tabular view. However, as discussed above with respect to claim 1, one having ordinary skill in the art would not combine Sauro and Kurata for a tabular view that *displays at least one of the plurality of chemical reactions in the one or more tables*.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 8. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 8 be withdrawn.

Claims 9-11 depend from independent claim 8 and, as such, incorporate all of the features of claim 8. The Examiner provides no justification for the rejection of claims 9-11, which recite additional patentable subject matter. Therefore, for at least the reasons set forth

above with respect to claim 8, Applicants respectfully urge that the above 35 U.S.C. §103(a) rejection of claims 9-11 be withdrawn.

<u>Claims 14-17</u>

Applicants' claim 14 recites:

> 14.   An article of manufacture having embodied thereon computer-readable instructions for improved modeling of a biological process comprising a plurality of chemical reactions, the article of manufacture comprising:
> computer-readable instructions for providing a graphical user interface for accepting user commands and data;
> computer-readable instructions for receiving, via the provided user interface, user commands and data;
> computer-readable instructions for constructing, using the received user commands and data, a model of the biological process, the model being represented in a tabular view and a graphical view, *the tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*;
> computer-readable instructions for generating, using the constructed model of the biological process, dynamic behavior of the modeled biological process; and
> computer-readable instructions for displaying the dynamic behavior of the biological process.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*, which is present in claim 14.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view is adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more*

tables. In Sauro and Kurata, there is no tabular format that receives user commands to construct the model.

Further, neither Sauro nor Kurata discloses or suggests that the tabular view is adapted to *display at least one of the plurality of chemical reactions in the one or more tables*. The Examiner recognizes that Sauro does not disclose this feature of claim 8 (Office Action at page 5). Instead, the Examiner relies on Kurata for the above-quoted tabular view. However, as discussed above with respect to claim 1, one having ordinary skill in the art would not combine Sauro and Kurata for a tabular view that *displays at least one of the plurality of chemical reactions in the one or more tables*.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 14. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 14 be withdrawn.

Claims 15-17 depend from independent claim 8 and, as such, incorporate all of the features of claim 14. The Examiner provides no justification for the rejection of claims 15-17, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 14, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 15-17 be withdrawn.

<u>Claims 20-23</u>

Applicants' claim 20 recites:

> 20.   A system for improved modeling of a chemical reaction comprising:
> a modeling environment accepting user commands and input for constructing a model of a chemical reaction, the model being represented in a tabular view and a graphical view, *the tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*;

           a simulation engine accepting as input the constructed
model of the chemical reaction and generating as output an
expected result; and
           an analysis environment in communication with the
simulation engine, the analysis environment displaying the
expected result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being a representation of at least a portion of the model in one or more tables*, *the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*, which is present in claim 20.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view is adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*. In Sauro and Kurata, there is no tabular format that receives user commands to <u>construct the model</u>.

Further, neither Sauro nor Kurata discloses or suggests that the tabular view is adapted to *display at least one of the plurality of chemical reactions in the one or more tables*. The Examiner recognizes that Sauro does not disclose this feature of claim 20 (Office Action at page 5). Instead, the Examiner relies on Kurata for the above-quoted tabular view. However, as discussed above with respect to claim 1, one having ordinary skill in the art would not combine Sauro and Kurata for a tabular view that *displays at least one of the plurality of chemical reactions in the one or more tables*.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 20. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 20 be withdrawn.

Claims 21-23 depend from independent claim 20 and, as such, incorporate all of the features of claim 20. The Examiner provides no justification for the rejection of claims 21-23, which recite additional patentable subject matter. Therefore, for at least the reasons set forth

above with respect to claim 20, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 21-23 be withdrawn.

<u>Claims 26-29</u>

Applicants' claim 26 recites:

> 26.   A computer-implemented method for integrated modeling, simulation and analysis of chemical reactions, the method comprising:
> providing a graphical user interface for accepting user commands and data;
> receiving, via the provided user interface, user commands and data;
> constructing, using the received user commands and data, a model of a chemical reaction, the model being represented in a tabular view and a graphical view, *the tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*;
> generating, using the constructed model of the chemical reaction, an expected result of the modeled chemical reaction; and
> displaying the expected result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*, which is present in claim 26.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that *the tabular view is adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*. In Sauro and Kurata, there is no tabular format that receives user commands to <u>construct the model</u>.

Further, neither Sauro nor Kurata discloses or suggests that the tabular view is adapted to *display at least one of the plurality of chemical reactions in the one or more tables*. The Examiner recognizes that Sauro does not disclose this feature of claim 26 (Office Action at page 5). Instead, the Examiner relies on Kurata for the above-quoted tabular view. However, as discussed above with respect to claim 1, one having ordinary skill in the art would not combine Sauro and Kurata.

For at least the reasons set forth above, Applicants respectfully urge that Sauro does not disclose or suggest each and every feature of Applicants' claim 26. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 26 be withdrawn.

Claims 27-29 depend from independent claim 26 and, as such, incorporate all of the features of claim 26. The Examiner provides no justification for the rejection of claims 27-29, which recite additional patentable subject matter. Therefore, for at least the reasons set forth above with respect to claim 26. Applicants respectfully request that the above 35 U.S.C. §102(a) rejection of claims 27-29 be withdrawn.

Claims 32-35

Applicants' claim 32 recites:

> 32.   An article of manufacture having embodied thereon computer-readable instructions for integrated modeling, simulation and analysis of chemical reactions, the article of manufacture comprising:
> computer-readable instructions for providing a graphical user interface for accepting user commands and data;
> computer-readable instructions for receiving, via the provided user interface, user commands and data;
> computer-readable instructions for constructing, using the received user commands and data, a model of a chemical reaction, the model being represented in a tabular view and a graphical view, the *tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*;

computer-readable instructions for generating, using the
constructed model of the chemical reaction, an expected result of
the modeled chemical reaction; and
computer-readable instructions for displaying the expected
result.

Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest at least a ***tabular view being a representation of at least a portion of the model in one or more tables***, ***the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables***, which is present in claim 32.

As discussed above with respect to claim 1, neither Sauro nor Kurata discloses or suggests that ***the tabular view is adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables***. In Sauro and Kurata, there is no tabular format that receives user commands to <u>construct the model</u>.

Further, neither Sauro nor Kurata discloses or suggests that the tabular view is adapted to ***display at least one of the plurality of chemical reactions in the one or more tables***. The Examiner recognizes that Sauro does not disclose this feature of claim 32 (Office Action at page 5). Instead, the Examiner relies on Kurata for the above-quoted tabular view. However, as discussed above with respect to claim 1, one having ordinary skill in the art would not combine Sauro and Kurata for a tabular view that ***displays at least one of the plurality of chemical reactions in the one or more tables***.

For at least the reasons set forth above, Applicants respectfully urge that Sauro and Kurata, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claim 32. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claim 32 be withdrawn.

Claims 33-35 depend from independent claim 32 and, as such, incorporate all of the features of claim 32. The Examiner provides no justification for the rejection of claims 33-35, which recite additional patentable subject matter. Therefore, for at least the reasons set forth

above with respect to claim 32, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 32-35 be withdrawn.

Claims 37-39

Claims 37-39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sauro in view of Kurata, and further in view of Shannon and Biospice. Applicants respectfully traverse the rejection.

Claim 37 depends from claim 1, and therefore includes each feature of claim 1. Claim 38 depends from claim 8, and therefore includes each feature of claim 8. Claim 39 depends from claim 14, and therefore includes each feature of claim 14. Each of claims 1, 8, and 14 includes a tabular view, *the tabular view being a representation of at least a portion of the model in one or more tables, the tabular view being adapted to receive the user commands and input to construct the model and display at least one of the plurality of chemical reactions in the one or more tables*. As noted above with respect to claims 1, 8, and 14, neither Sauro nor Kurata discloses or suggests this feature of claims 1, 8, and 14.

The addition of Shannon and Biospice fails to cure the factual deficiencies of Sauro and Kurata regarding the above-quoted feature of claims 1, 8, and 14. Shannon describes Cytoscape, an application for "integrating biomolecular interaction networks with high-throughput expression data and other molecular states into a unified conceptual framework" (Shannon at Abstract). Shannon does not include any tabular view adapted to receive user commands and input to construct the model.

Biospice is generally directed to an application to develop "a physically-grounded, molecular understanding of bacterial stress response," "an infrastructure suitable for rapid deduction of pathway dynamics," and "a theoretical and computational infrastructure [to] store, relate and model the data at different levels of abstraction" (Biospice at "Goals"). The Biospice presentation also does not disclose or suggest a tabular view adapted to receive user commands and input to construct the model.

For at least the reasons set forth above, Applicants respectfully urge that Sauro, Kurata, Shannon, and Biospice, alone or in any reasonable combination, do not disclose or suggest each and every feature of Applicants' claims 37-39. Therefore, Applicants respectfully request that the above 35 U.S.C. §103(a) rejection of claims 37-39 be withdrawn.

CONCLUSION

In light of the above, Applicants respectfully urge that all of the pending claims are in condition for allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact the Applicants' attorney at (617) 227-7400.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. MWS-111RCE. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

Dated: May 4, 2009   Respectfully submitted,

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